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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,764	07/30/2003	Akira Aoto	.10517/180	7701

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KENYON & KENYON LLP
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WASHINGTON, DC 20005

EXAMINER

RUTHKOSKY, MARK

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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10/16/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/629,764	Applicant(s) AOTO, AKIRA	
	Examiner Mark Ruthkosky	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 12 and 13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 12-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>5/7/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/7/2007 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-10 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meacher et al. (US 5,858,569) in view of Hiroshi et al. (JP 11-339,828) OR unpatentable over Hiroshi et al. (JP 11-339,828) in view of Meacher et al. (US 5,858,569), and further in view of Yoshimura et al. (US 6,291,094.)

The instant claims are to an apparatus comprising a separator for a fuel cell comprising a metal plate including a gas passage portion and a contact portion in a part other than the gas passage portion, the contact portion being located further to the side of a periphery of the metal

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plate than the gas passage portion, a conductive surface of the contact portion being exposed, and a terminal of a cell voltage monitor, wherein the exposed conductive surface of the contact portion contacts the terminal, and wherein an anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating, and an anti-corrosion surface treatment on the contact portion is the metal plating being brought into contact with the terminal of the cell voltage monitor directly.

Meacher et al. (US 5,858,569) teaches a separator for a fuel cell comprising a metal plate including a carbon coated gas passage portion and a peripheral foil contact portion in a part other than the gas passage portion, wherein the carbon-coated surface treatment applied to the gas passage portion is different from a surface treatment applied to the contact portion. The untreated frame/stainless steel section is a contact portion other than the gas passage portion and also may serve as an attachment portion (see col. 5, line 20- col. 6, line 13.) The individual fuel cells are electrically connected in the stack and clamped. A gasket frame portion is noted on the surface of the peripheral foil contact portion (cols. 5-6, figure 6.) The cells are connected with good electrical contact throughout the stack while insulating individual anode and cathode contacts of the stack (col. 1, line 40 to col. 2, line 4.) Meacher et al. (US 5,858,569) does not teach the contact portion being brought into contact with a terminal of a cell voltage monitor attached to the fuel cell or that the anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating, and an anti-corrosion surface treatment on the contact portion is the metal plating being brought into contact with the terminal of the cell voltage monitor directly.

Hiroshi et al. (JP 11-339, 828) teaches a fuel cell stack with a voltage-measuring terminal attached to the sidewall of the separator plate. The fuel cell separator plates have a protruding terminal integral with the separator for measuring the voltage of each cell in the fuel cell stack. The separator may be graphite, aluminum and stainless steel (paragraph 28.) The terminal is engaged with a voltage monitor (paragraphs 12-29.) The attachment portion is attached in the direction wherein a plurality of frames are stacked as taught in figure 1. With regard to claim 13, the references teach gas manifold portions outside of the gas passages (for example, see figures 3-4 of '828.) Hiroshi et al. (JP 11-339,828) does not teach the metal separator plate is coated with a carbon layer in the area of gas flow along the separator plate.

It would be obvious to one of ordinary skill in the art at the time the invention was made to attach a terminal in the manner taught by Hiroshi et al. (JP 11-339,828) to the frame portion of the separator plate of Meacher et al. (US 5,858,569) in order to measure the voltage of each cell in the fuel cell stack as taught by Hiroshi et al. (JP 11-339,828.) The attachment portion may be attached to the stainless steel frame by soldering or welding as taught by Hiroshi et al. (JP 11-339,828.) As the outer surface of the plate is not coated, it would be accessible to the exterior measuring device. Further, the skilled artisan would understand that the welding of the metal lead to the metal plate would provide a secure weld as compared with the carbon coating. Coating the attachment portion with a gasket will allow for the sealing of the fuel cells which prevents fuel, oxidant and water leakage from the fuel cell. The gasket serves as an anti-corrosion surface treatment on the peripheral foil portion.

Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to coat the gas flow portion of the separator plate taught by Hiroshi et al. (JP

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11-339,828) with the carbon layer of material on of the separator plate of Meacher et al. (US 5,858,569) in order to flow gas through grooves and form an electrically conductive path for current generated in the groove regions of the cell to flow laterally to areas where the contacting portions of the separator plates. It would further be obvious to one of ordinary skill in the art at the time the invention was made to apply a conductive coating, such as graphite, to the stainless steel plate in order to allow for gas flow and electrical conduction. Hiroshi et al. (JP 11-339,828) teaches the plate may be of aluminum or stainless steel. For example, one of ordinary skill in the art would be motivated to coat the stainless steel plate with an aluminum coating as Hiroshi et al. (JP 11-339,828) teaches aluminum as a conductive separator material that forms a bond with a protruding terminal. Further, the contact faces between adjacent separators can be provided with sufficiently high electronic conductivity and the internal resistance of the cell can be reduced to increase the output voltage of the fuel cell (as evidenced by US 6,291,094.)

The references do not teach that the anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating, and an anti-corrosion surface treatment on the contact portion is the metal plating being brought into contact with the terminal of the cell voltage monitor directly.

Yoshimura et al. (US 6,291,094), however, teaches a fuel cell comprising a grooved metal plate including a first metal coating and a second carbon coating on a gas passage portion and a contact portion in a part other than the gas passage portion, wherein the surface treatment is applied to the entire gas passage portion (see the claims, figures 4 and 8-11, and the corresponding text found in at least col. 6, lines 6-end and col. 7, line 30 to col. 8, line 65.) The separator includes a metal such as stainless steel, coated with a protective, conductive layer

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followed by a coating of carbon (cols. 6-8. The carbon may selectively added to the gas passage areas (see col. 14.) The frame/stainless steel section is a contact portion other than the gas passage portion and also serves as an attachment portion. The metal plate includes a gas passage area. With regard to claim 13, the references teach gas manifold portions outside of the gas passages (for example, see figures 3-4 of '828 and figure 2 of '094.)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating as taught in Yoshimura et al. (US 6,291,094.) The coatings will provide corrosion resistance and high conductivity for the transfer of electrons in a fuel cell (for example, see col. 7, lines 30-end.) Further, it would be obvious to one of ordinary skill in the art to include different anti-corrosion materials on the different surfaces of the separator plate in order to achieve desired properties of the plate, such as anti-corrosion and/or high conductivity. The references teach adding an anti-corrosion layer to prevent passivation of the separator (see Yoshimura, as noted), to give improved conductivity (graphite) and to promote sealing and conduction between fuel cell components. One of ordinary skill in the art would understand to add each of these materials to give the desired effect taught in the reference. For example, adding graphite on the interior of the separator give improved conduction, as taught in Meacher, and using a polymer gasket on the edge surface of the plate seals the edges of the cell and protects the plate. Further, it would have been obvious to the skilled artisan to form a metal-plated anti-corrosion surface treatment on the contact portion brought into contact with the terminal of the cell voltage monitor directly in order to protect the connection portion from corrosion. For example Yoshimura teaches that highly conductive

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metals may be used to optimize conduction (col. 8, lines 30-65,) but these materials are also easily oxidized wherein the material will have essentially no conductivity. Therefore, a coating metal is added that has good conductivity when oxidized to prevent oxidation of the core metal. From these teachings, it would be obvious to use a highly conductive material as a terminal on the fuel cell plate and to coat the material with a protective coating to retain the conductive features of the terminal. Further, it would be obvious to coat all metal portions that are exposed and reactive to corrosive agents including manifolds and gas flow channels. However, since the terminal is taught to be attached to the plate by welding and the like, it would be obvious to the skilled artisan to exclude a carbon coating from the section that has the terminal engaged with the separator in order to provide a secure attachment. The artisan would have found the claimed invention to be obvious in light of the teachings of the references.

Response to Arguments

Applicant's arguments, filed 5/7/2007, with respect to the amended claims have been fully considered, but are not persuasive. Applicant argues that the combination of references does not teach the an anti-corrosion surface treatment on the gas passage portion includes a metal plating and a carbon coat formed on the metal plating, and an anti-corrosion surface treatment on the contact portion is the metal plating being brought into contact with the terminal of the cell voltage monitor directly.

The Yoshimura reference is cited for teaching an inexpensive and corrosion resistant metal-made gas separator. A metal plate is completely coated with a first coating layer and a second coating layer of graphite. The coatings protect the plate by achieving a sufficiently high

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corrosion resistance (col. 7.) The resistance of the plate is improved by preventing the corrosion of material that forms a passivating layer. The coatings will provide corrosion resistance and high conductivity for the transfer of electrons in a fuel cell (for example, see col. 7, lines 30-end.) From the teachings cited in the rejection, it would be obvious to use a highly conductive material as a terminal on the fuel cell plate and to coat the material with a protective coating to retain the conductive features of the terminal. Further, it would be obvious to coat all metal portions that are exposed and reactive to corrosive agents including manifolds and gas flow channels. However, since the terminal is taught to be attached to the plate by welding and the like, it would be obvious to the skilled artisan to exclude a carbon coating from the section that has the terminal engaged with the separator in order to provide a secure attachment. One of ordinary skill in the art would recognize that the metals taught in the reference would be securely attached by welding and that a carbon surface between the two metals will impede the attachment. The artisan would have found the claimed invention to be obvious in light of the teachings of the references.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky

Primary Patent Examiner

Art Unit 1745

Mark Ruthkosky
6/11/2007